Australian Government
Department of Infrastructure and Transport

Transport Canada

Joint Australian and Canadian Pole Side Impact Research

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Program Overview

- Paired comparisons of 29 km/h perpendicular and 32 km/h oblique pole side impact tests.
- WorldSID 50th percentile adult male with RibEye used on the struck (left) side of each vehicle.
- WorldSID 50th percentile adult male with IRTRACC used on the non-struck (right) side of each vehicle.
- Fiat 500 vehicles tested:
  - Results compared from matched tests of the Australian market vehicle and the Canadian market vehicle.

Fiat 500

Airbag Control Module

Australian Model

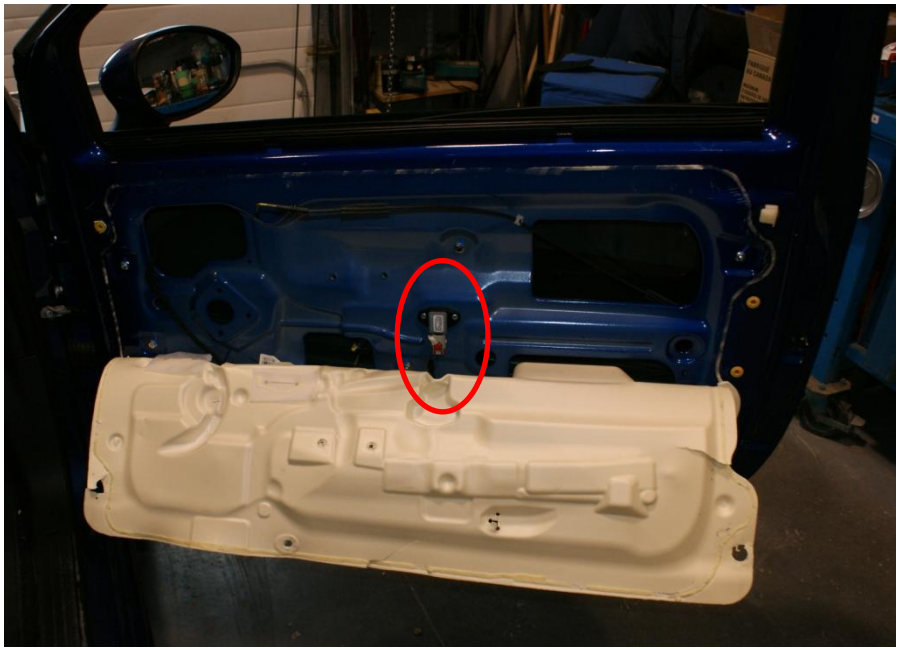
Canadian Model

- The Australian and Canadian models had different airbag control modules.
- This may be partly due to frontal impact differences (but not entirely).

Fiat 500

Side Impact Sensors (Peripheral Pressure Sensing)

Australian Model



Canadian Model

- Canadian model had a side door cavity pressure sensor that Australian model did not.
- Both models had b-pillar acceleration sensors (but these were mounted in different locations).

Fiat 500

Side Curtain and Thorax Airbag Coverage (front row)

Australian Model

Canadian Model

- The Canadian model had a larger curtain airbag.
- The Canadian model thorax airbag was larger, more integrated with the curtain and appears to provide more coverage of the shoulder, upper arm and lower pelvis.

Fiat 500

Side Curtain and Thorax Airbag Coverage (front row)

US Model (from US NCAP)

Canadian Model

- The US model appears to have the same side head curtain and thorax airbag design as the Canadian model.

Fiat 500

Side Curtain Airbag Coverage (rear row)

Australian Model

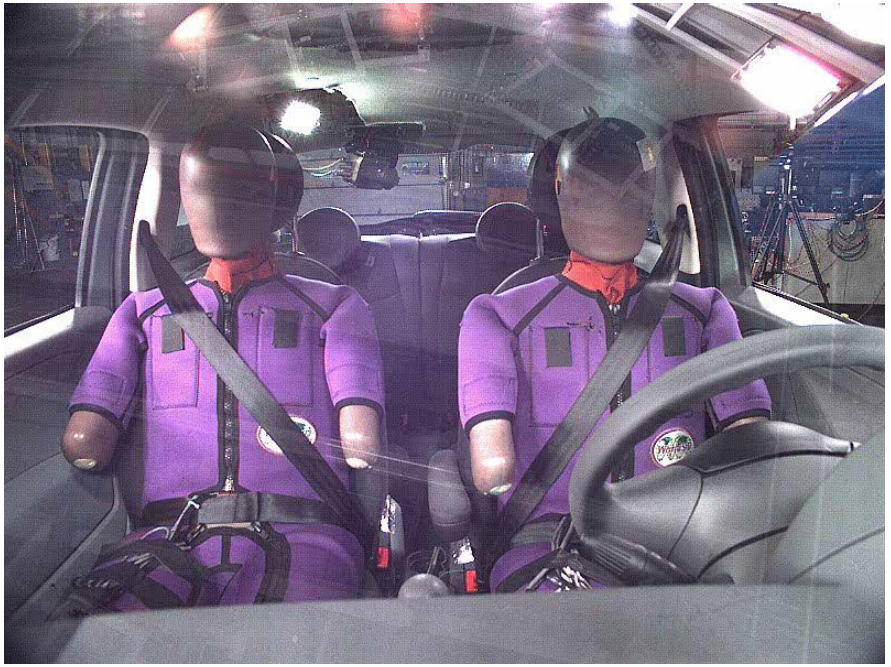
Canadian Model

- The Australian model side curtain airbags end near the b-pillar (i.e. are for the front row occupants only).
- The Canadian model had a side curtain airbag that extended to the second row.

Fiat 500

32 km/h Oblique Pole Test Footage

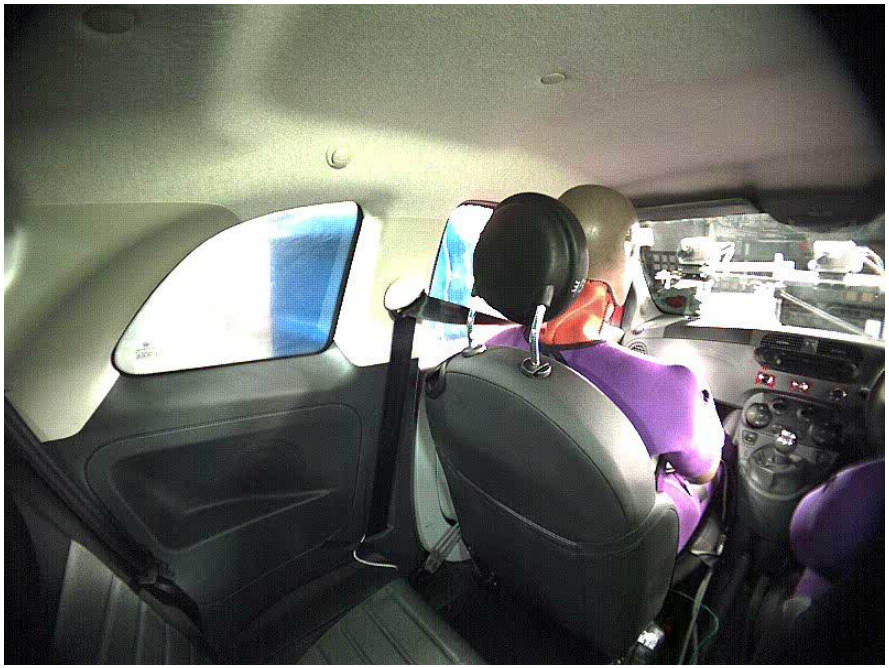
Australian Model



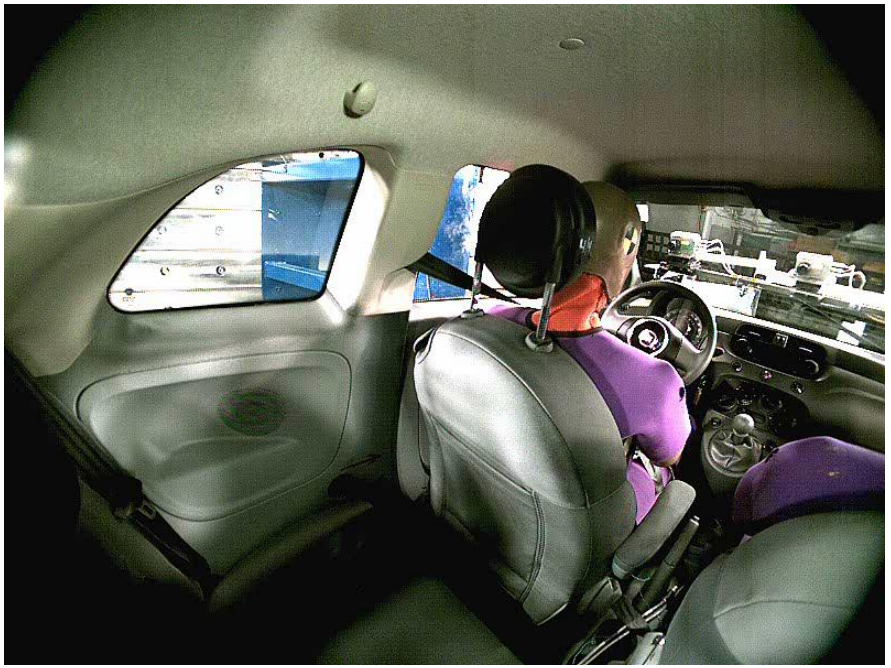
Canadian Model

Fiat 500

32 km/h Oblique Pole Test Footage



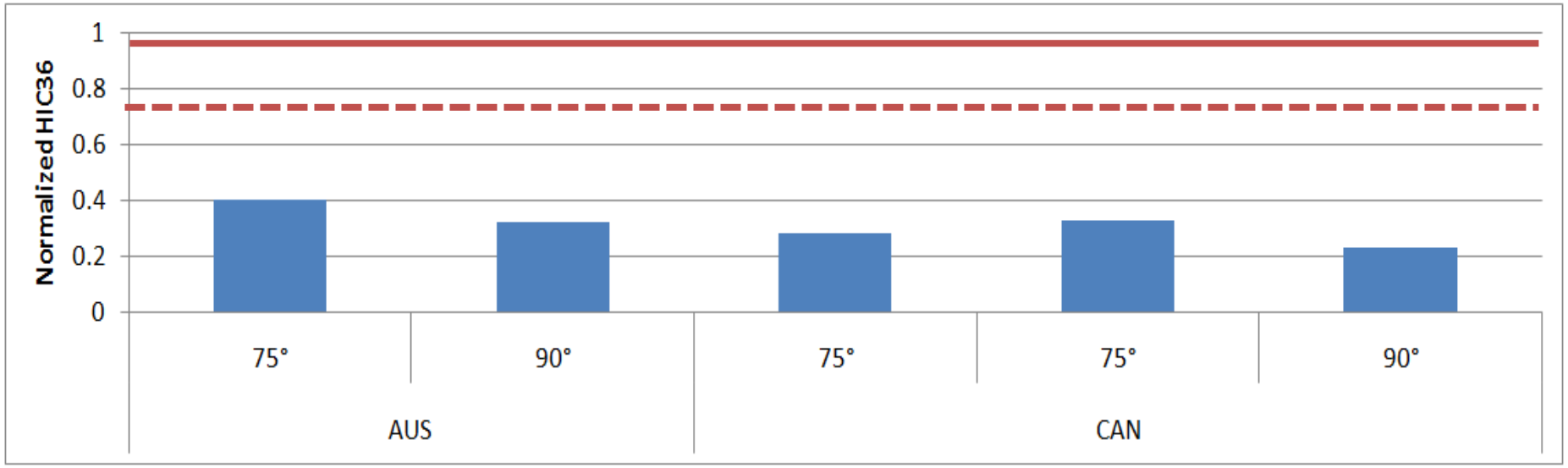
Australian Model



Canadian Model

Head Injury Risk

HIC36 (excluding dummy occupant-to-occupant head interactions / calculated for t < 80ms)



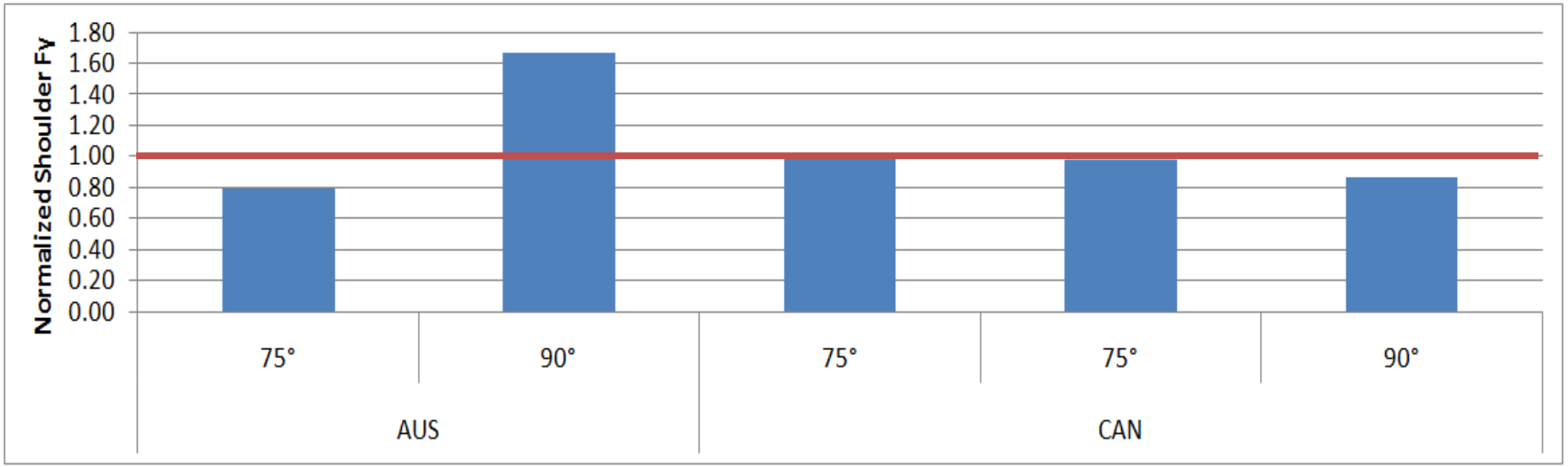
50% AIS 3+ Head Injury Risk

30% AIS 3+ Head Injury Risk

Head injury risk has been determined using the Prasad/Mertz AIS 3+ skull fracture probability risk function published in FMVSS 214 Final Regulatory Impact Analysis (August 2007).

Shoulder Injury Risk

Maximum Lateral Shoulder Force (Fy)



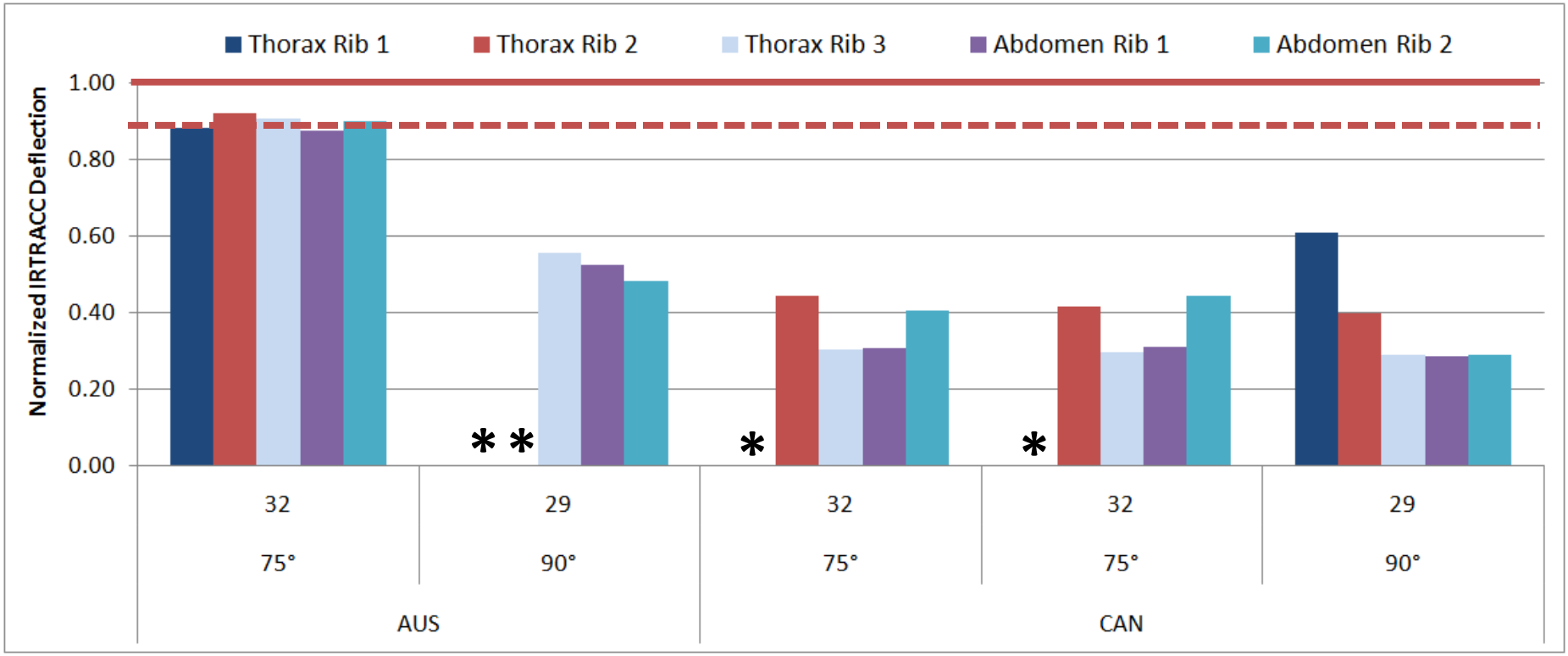
50% AIS 2+ Shoulder Injury Risk

Shoulder injury risk has been determined from the AIS 2+ (survival method) shoulder injury risk values published by Petitjean et al., Stapp 2009.

Thorax Injury Risk

Maximum Theoretical IRTRACC Deflection

* RibEye dropouts / analysis required.



50% AIS 3+ Thorax Injury Risk

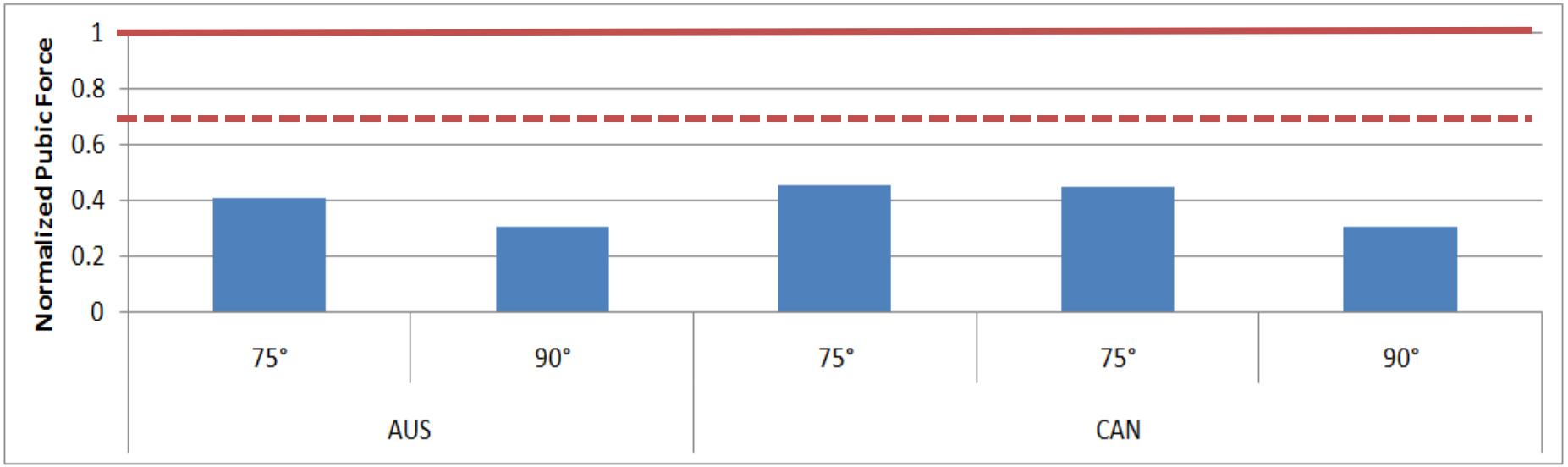
30% AIS 3+ Thorax Injury Risk

Thorax injury risk has been determined from the AIS 3+ (survival method) thorax injury risk values (adjusted to 45 year old) published by Petitjean et al., Stapp 2009.

Note: Each IRTRACC deflection has been calculated from middle RibEye LED x,y and z axis channel data.

Pelvis Injury Risk

Peak Pubic Symphysis Force

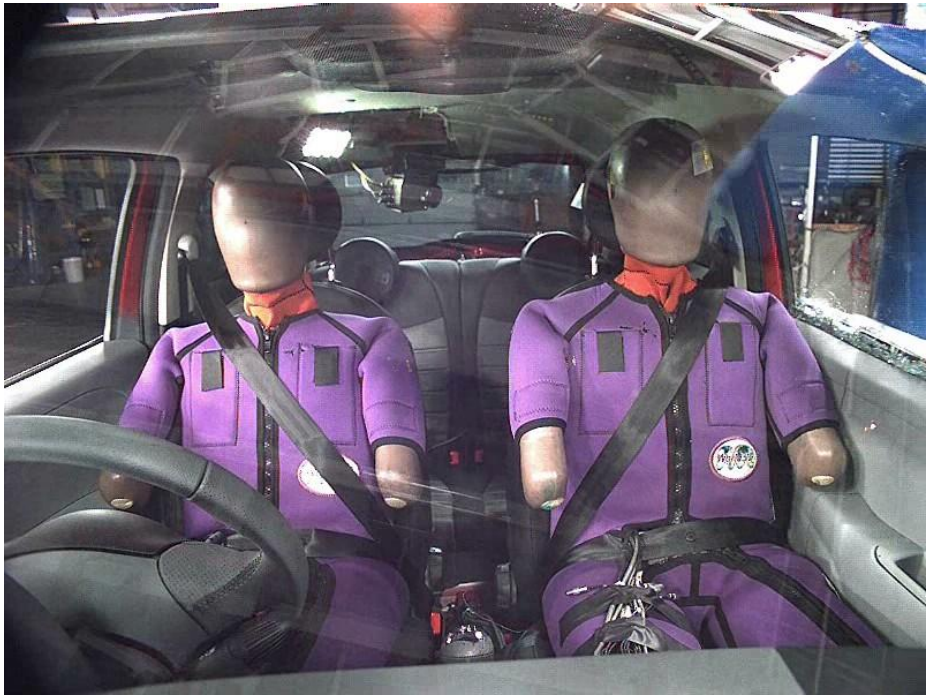


50% AIS 3+ Pelvis Injury Risk

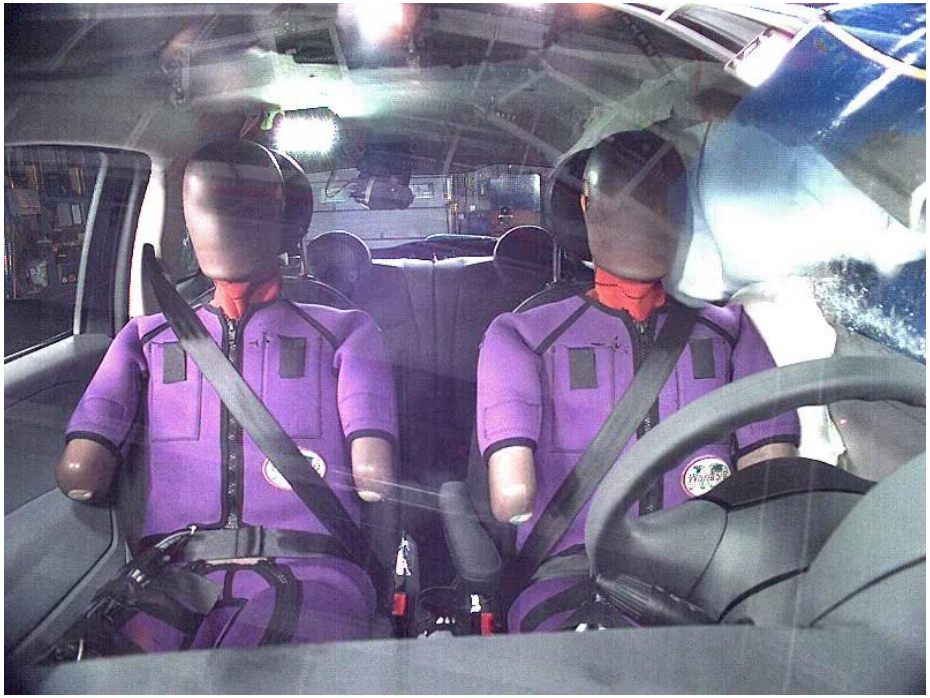
5% AIS 3+ Pelvis Injury Risk

Pelvis injury risk has been determined from the AIS 3+ (survival method) pelvis injury risk values (adjusted to 45 year old) published by Petitjean et al., Stapp 2009.

Airbag Deployment

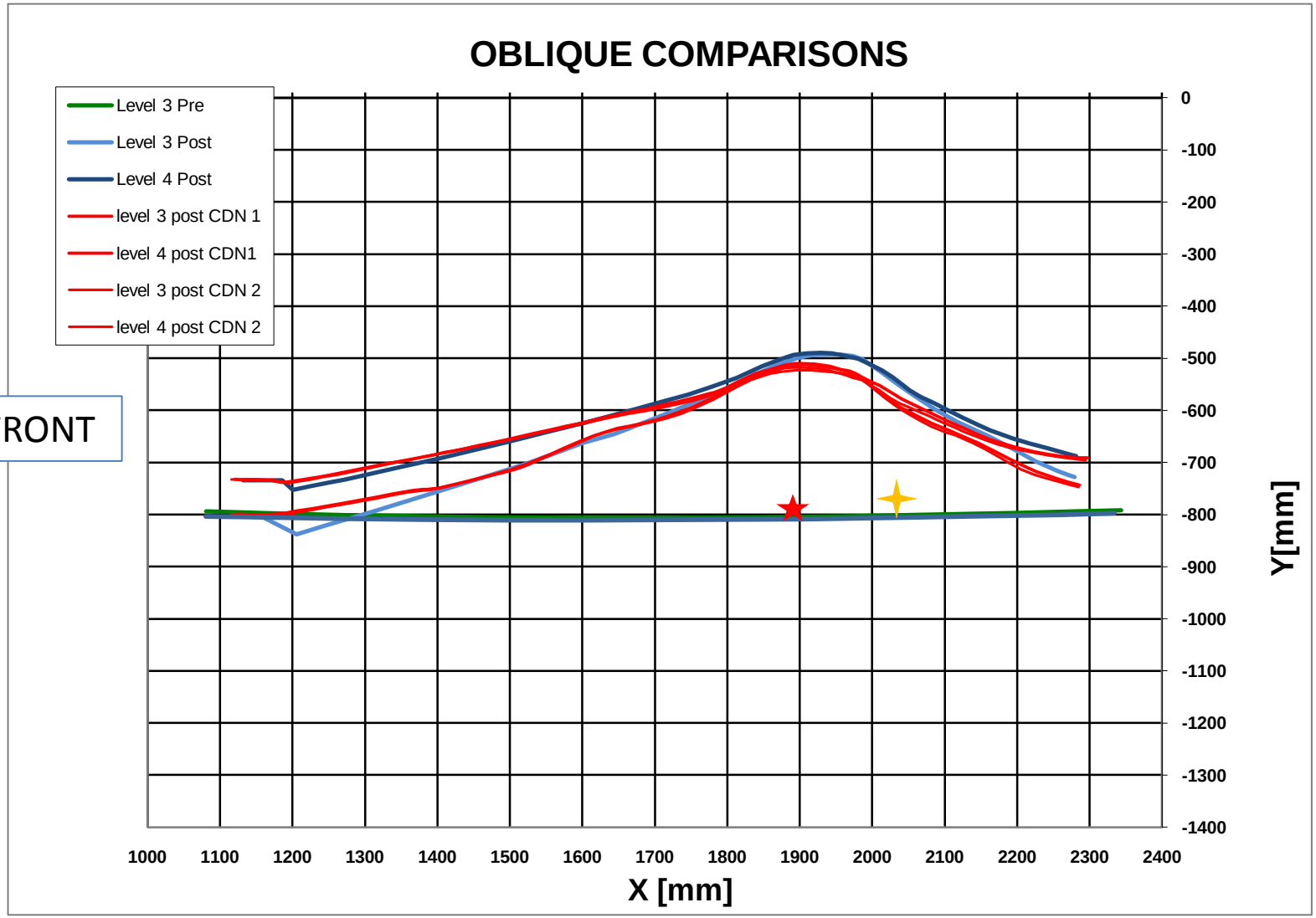


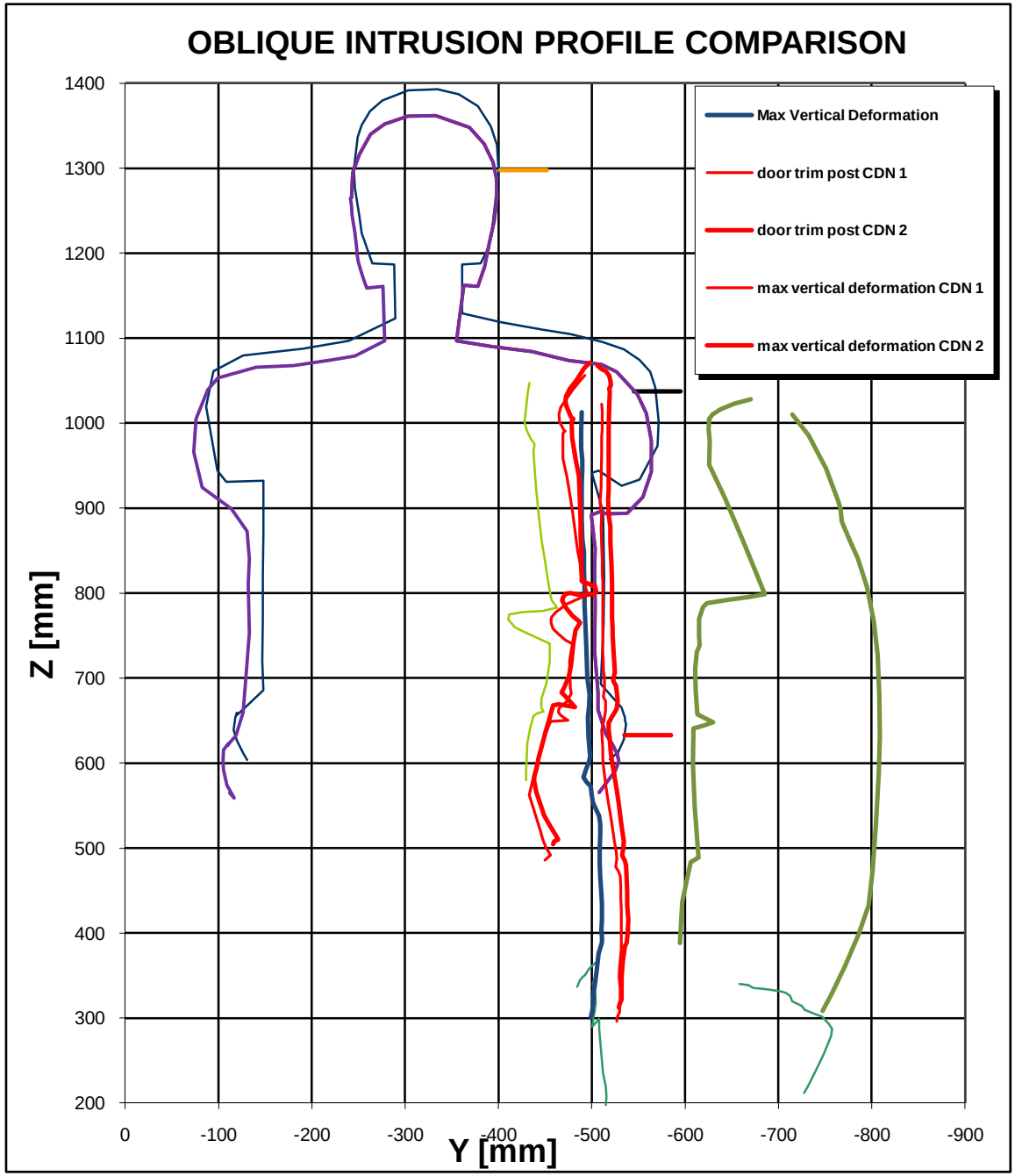
Australian Model



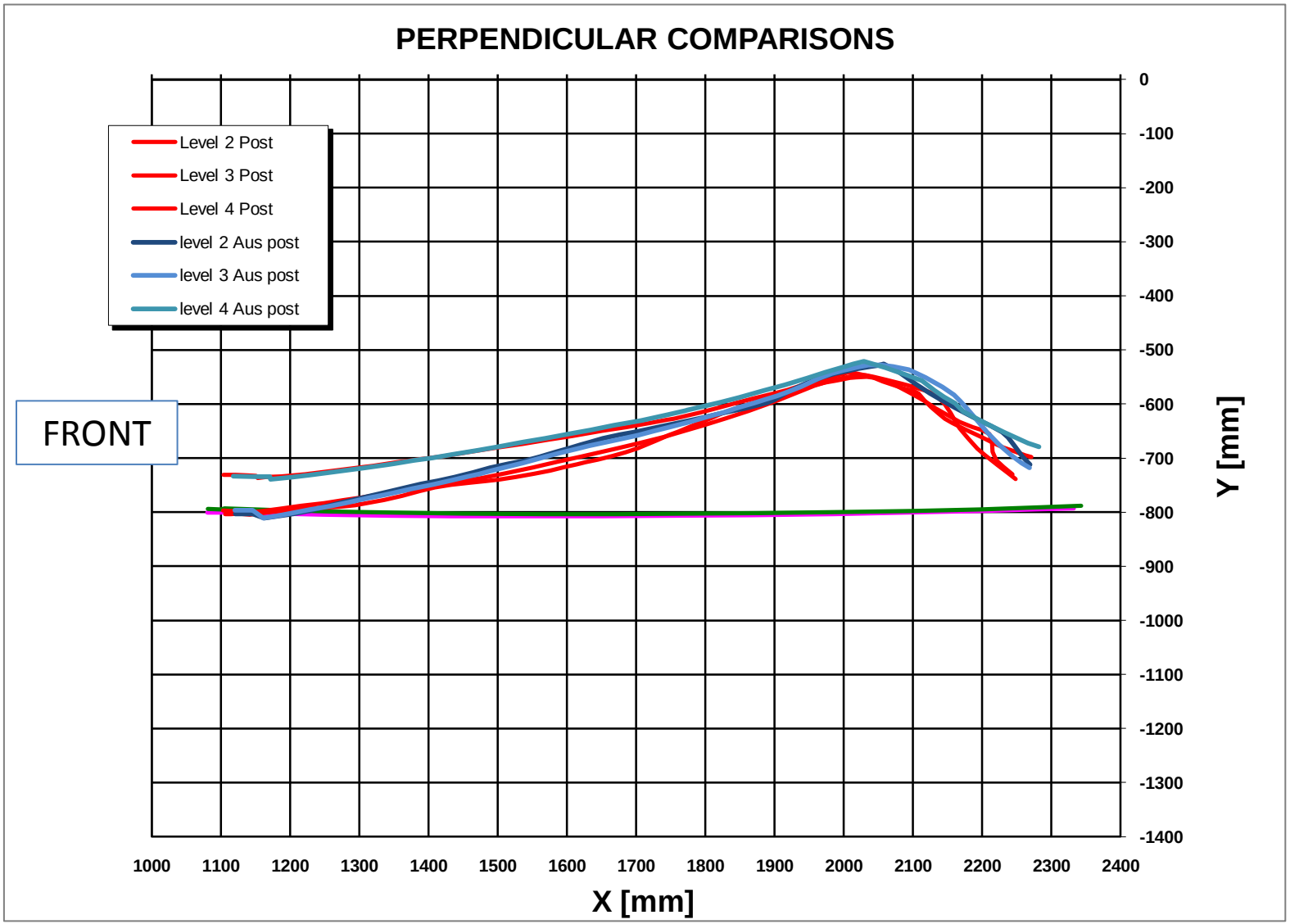
Canadian Model

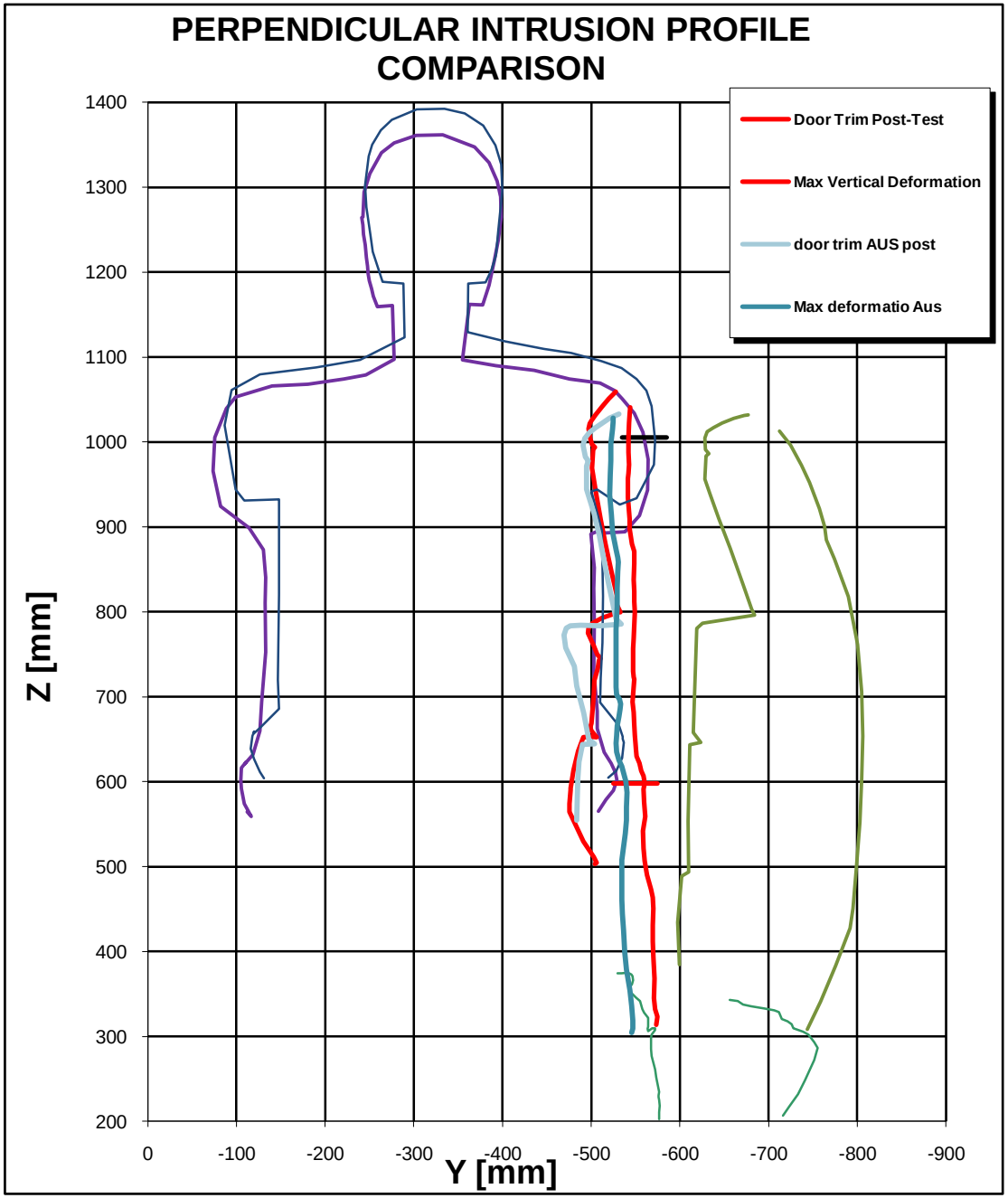
Residual Deformation




OBLIQUE INTRUSION PROFILE COMPARISON
Max Vertical Deformation
door trim post CDN 1
door trim post CDN 2
max vertical deformation CDN 1
max vertical deformation CDN 2
Z [mm]
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
0
-100
-200
-300
-400
-500
-600
-700
-800
-900
Y [mm]

Residual Deformation

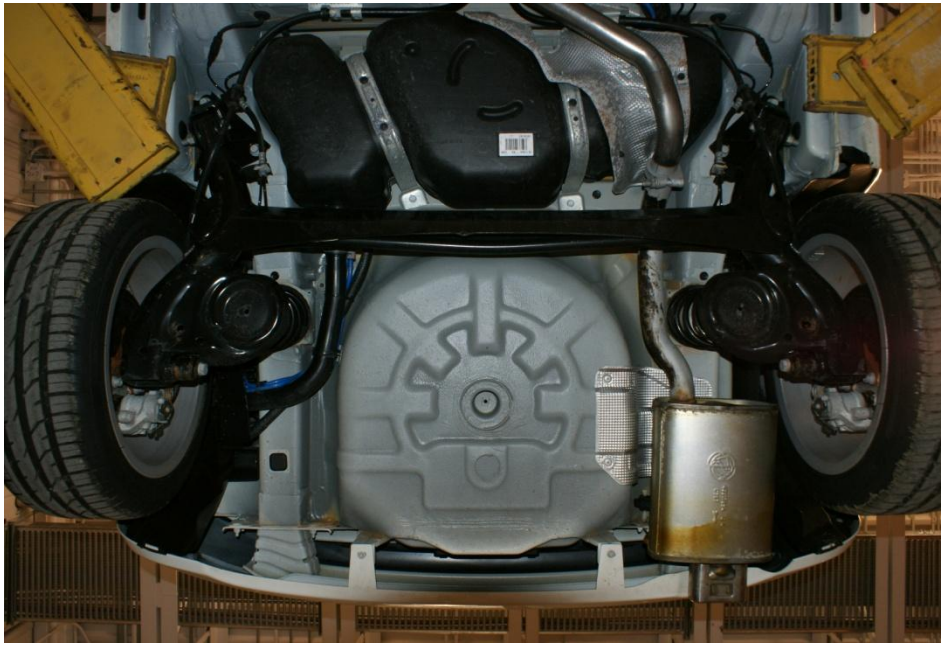



PERPENDICULAR INTRUSION PROFILE COMPARISON
Door Trim Post-Test
Max Vertical Deformation
door trim AUS post
Max deformatio Aus
Z [mm]
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
0
-100
-200
-300
-400
-500
-600
-700
-800
-900
Y [mm]

Undercarriage

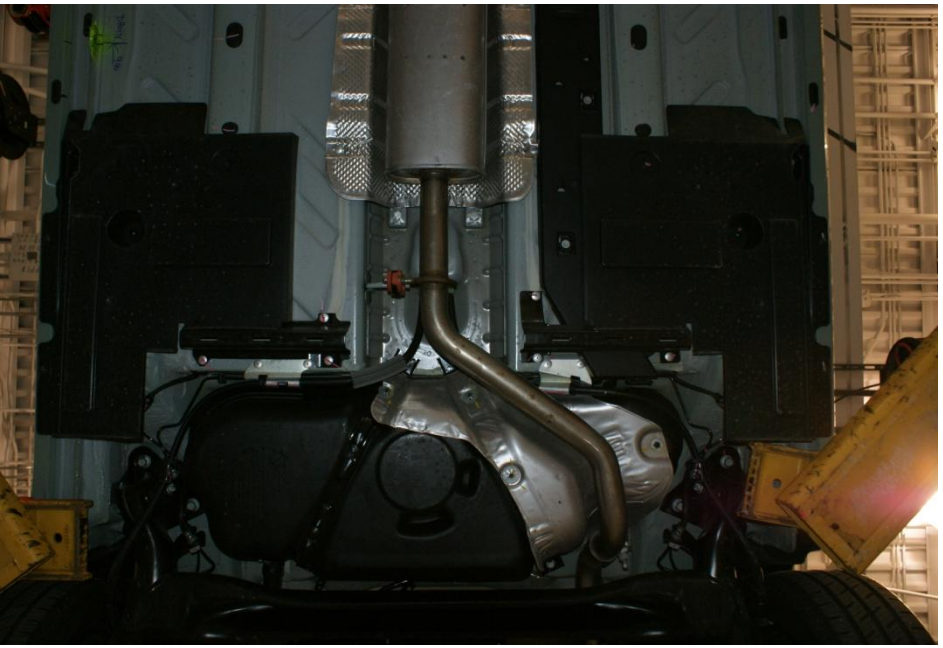
CANADIAN

AUSTRALIAN

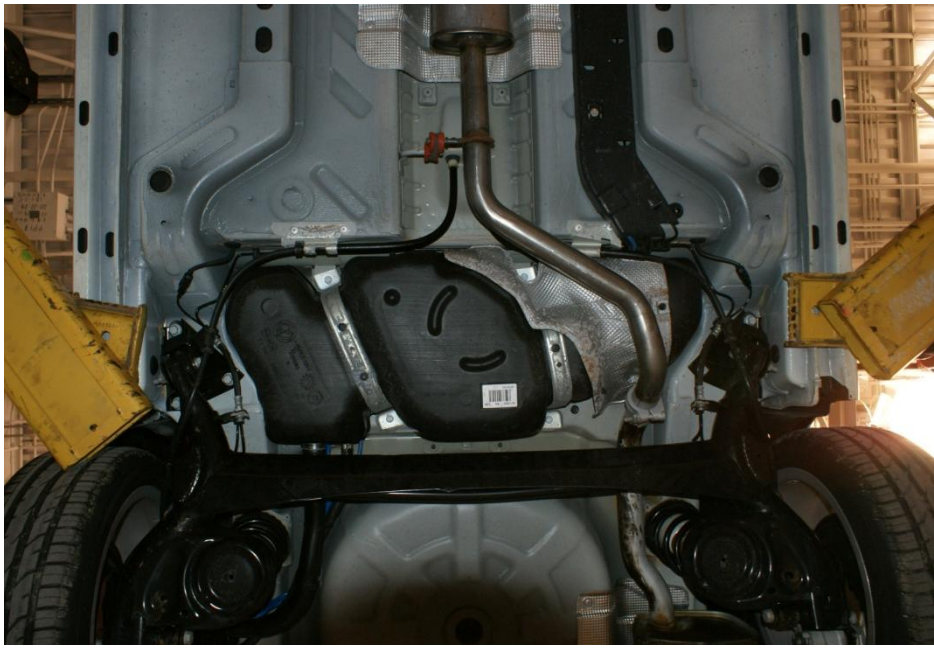


Undercarriage

CANADIAN

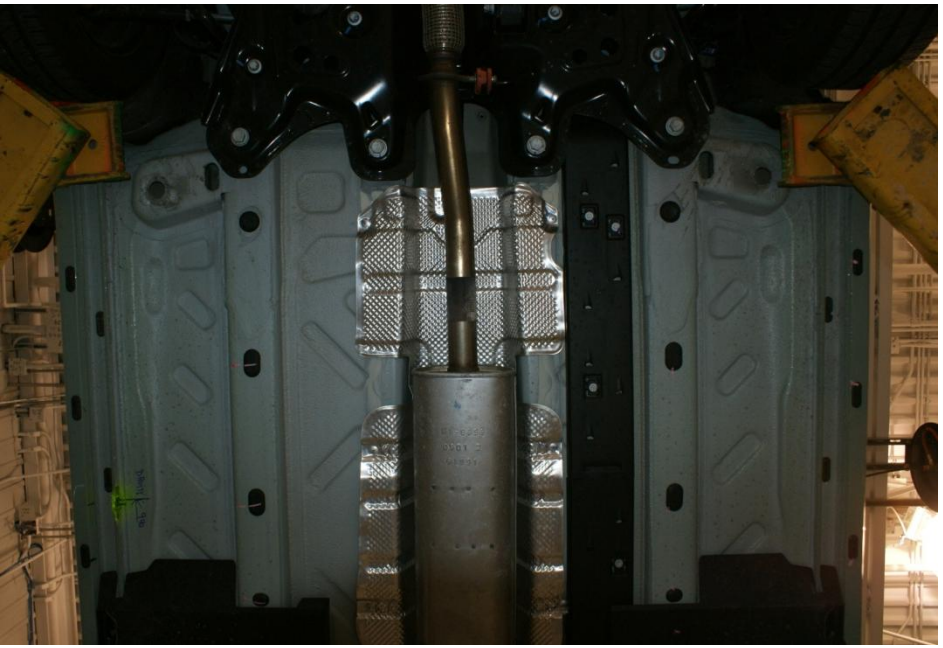


AUSTRALIAN

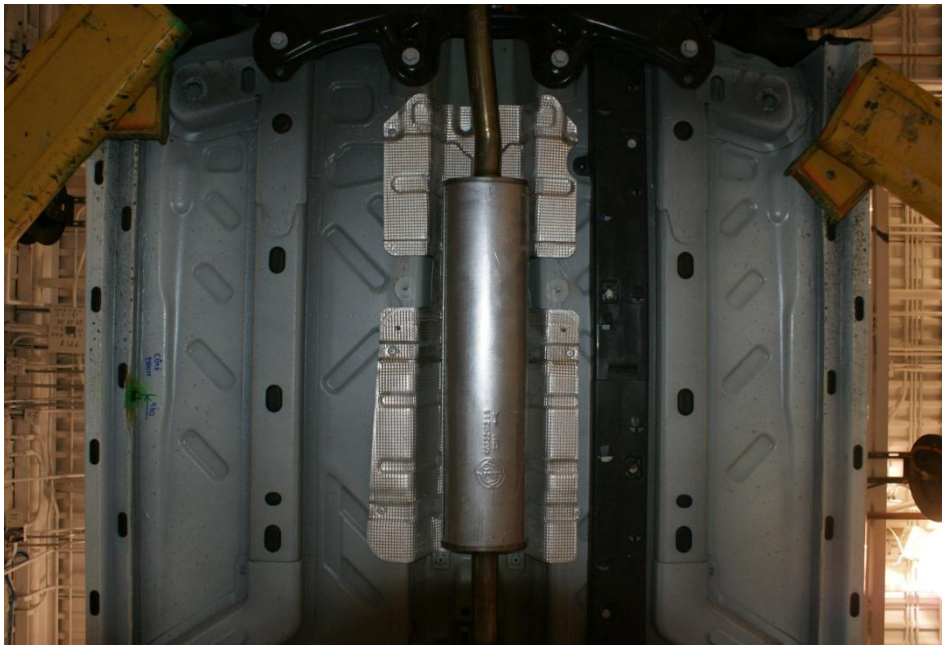


Undercarriage

CANADIAN



AUSTRALIAN



Undercarriage

CANADIAN

AUSTRALIAN

Summary

- Australian and Canadian market Fiat 500s have different airbag control modules, different side impact sensors and different side airbags.
- Canadian Fiat 500 side airbags look the same as the US Fiat 500 side airbags.
- WorldSID 50th percentile male dummy responses indicate similar AIS 3+ head and pelvis injury risk for the Australian and Canadian Fiat 500 models.
- WorldSID 50th percentile male dummy responses indicate a significantly lower AIS 3+ thorax injury risk for the Canadian model.
- Results from repeated 32 km/h oblique pole tests of Canadian Fiat 500 show good WorldSID 50th male repeatability.

Thank you